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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/747,977	12/29/2003	Kevin W. Rudd	42P18220	9034

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EXAMINER
ELMORE, REBA I

ART UNIT	PAPER NUMBER
2189	

MAIL DATE	DELIVERY MODE
08/08/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

	Application No.	Applicant(s)
Office Action Summary	10/747,977	RUDD ET AL.
	Examiner	Art Unit	
	Reba I. Elmore	2189	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
  Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>26 March 2007</u>.

2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) <u>1-31</u> is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) <u>1-31</u> is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All   b)☐ Some * c)☐ None of:

      1.☐ Certified copies of the priority documents have been received.

      2.☐ Certified copies of the priority documents have been received in Application No. _____.

      3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☒ Information Disclosure Statement(s) (PTO/SB/08)
    Paper No(s)/Mail Date <u>12/1/06</u>.

4)☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____.

5)☐ Notice of Informal Patent Application

6)☐ Other: _____.

DETAILED ACTION

1.   Claims 1-31 are presented for examination.

2.   In view of the arguments filed on March 26, 2007, PROSECUTION IS HEREBY

REOPENED. A new rejection is set forth below based on Appellant's definition of the disputed

terminology.

To avoid abandonment of the application, appellant must exercise one of the following

two options:

(1) file a reply under 37 CFR 1.111 (if this Office action is non-final) or a reply under 37

CFR 1.113 (if this Office action is final); or,

(2) initiate a new appeal by filing a notice of appeal under 37 CFR 41.31 followed by an

appeal brief under 37 CFR 41.37. The previously paid notice of appeal fee and appeal brief fee

can be applied to the new appeal. If, however, the appeal fees set forth in 37 CFR 41.20 have

been increased since they were previously paid, then appellant must pay the difference between

the increased fees and the amount previously paid.

A Supervisory Patent Examiner (SPE) has approved of reopening prosecution by signing

below:

SPECIFICATION

3.   The specification has not been checked to the extent necessary to determine the presence

of all possible minor errors. Applicant's cooperation is requested in correcting any errors of

which applicant may become aware in the specification.

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35 USC § 112, 1st Paragraph

4.   The rejection of claims 1-31 as failing to comply with the enablement requirement under 35 USC § 112, 1st paragraph is *maintained* and repeated below.

5.   The following is a quotation of the first paragraph of 35 USC § 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

6.   Claims 1-31 are rejected under 35 USC § 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

7.   The terminology 'volatile' and 'non-volatile' has been used extensively in the specification and claims without clearly defining the meaning of these terms within the scope of the present invention. Additionally, these terms are already associated with memory devices within the memory arts and cannot be used to now have a different meaning.

35 USC § 112, 2nd Paragraph

8.   The rejection of claims 1-31 under 35 USC § 112, 2nd paragraph, as being indefinite is *maintained* and repeated below.

9.   The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

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10.   Claims 1-31 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for

failing to particularly point out and distinctly claim the subject matter which applicant regards as

the invention.

11.   The claim language uses the terms 'volatile' and 'non-volatile' in conjunction with cache

lines and cache line segments without adequately providing meanings within the specification for

this use of the terms. These terms are commonly associated with memory devices and not with

data within a memory device or cache. This does not provide a clear, distinct description of the

present invention within either the specification or in the claims themselves. The metes and

bounds of the claim language cannot be determined.

12.   The claim language uses the following terms 'modified volatile', 'exclusive volatile' and

'shared volatile' while the specification fails to clearly redefine the terminology. The

specification is filled with 'it may indicate' language (paragraph 0020 of the Applicant's

specification for example although this language is used throughout the specification). If the

language 'may indicate' a condition or state the implication is it 'may not indicate' such a

condition or state as well. This is not a positive recitation of a meaning of the given terminology.

The specification is written in such a way that not only the terminology is imprecise but the

definitions or qualifications of the terminology is imprecise as well. This inhibits a clear

understanding of the meaning of the actual language used in both the body of the specification

and the claims which impacts a clear understanding of the claim language. It is true that the

claims must be considered as a whole, however, this does not preclude there being problems with

parts of the claims. The claims must be considered *as a whole in light of the specification*. In

this present specification, the meaning of the cited terminology is ambiguous.

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13.   Where applicant acts as his or her own lexicographer to specifically define a term of a

claim contrary to its ordinary meaning, the written description must clearly redefine the claim

term and set forth the uncommon definition so as to put one reasonably skilled in the art on

notice that the applicant intended to so redefine that claim term. *Process Control Corp. v.*

HydReclaim Corp., 190 F.3d 1350, 1357, 52 USPQ2d 1029, 1033 (Fed. Cir. 1999). The terms

"volatile" and "non-volatile" in the claims appear to be used by the claims to mean status

conditions associated with data in a cache line or segments of a cache line, while the accepted

meanings of these terms are descriptive of memory hardware devices and the loss of data when

the memory device loses power. The terms are indefinite because the specification does not

clearly redefine the terms. For instance, paragraphs 0021 and 0022 explain that there 'may' be

no difference between a 'shared volatile state' and an 'exclusive volatile state' as both 'may

include' segments of a cache in which segments are shared in either a volatile or non-volatile

state. See MPEP 2111.01.

14.   Due to the Applicant's insistence the following metes and bounds are given to the claim

language and art has been applied using the an interpretation as given: 'modified segment' *may*

be a segment that contains data that *may be* changed by the owning processor without

notification to other processors or devices and a 'non-volatile segment' *may be* a segment that

may generate a notification to a sharing processor or device if it is modified by the owning

processor or device (e.g., see pages 8-9 of the appeal brief).

35 USC § 102

15.   The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the

basis for the rejections under this section made in this Office action:

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A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

16.   Claims 1-31 are rejected under 35 U.S.C. 102(b) as being anticipated by Baylor et al. P/N 5,822,763.

17.   Baylor teaches the invention (claims 1, 9, 13, 17, 21, 26 and 29) as claimed including a device and method comprising:

means for storing data as being either caches or memory modules (e.g., see Figure 1);

means for tracking either a shared volatile state, a modified volatile state and an exclusive volatile state for the means for storing data as being a transient state of the data (e.g., see col. 2, line 61 to col. 3, line 2);

a first cache in a first central processing unit to store a first cache line in either a shared volatile state, exclusive volatile state or a modified volatile state (e.g., see Figure 1, elements labeled by a 1);

a second cache in a second central processing unit in communication via a system interconnect with the first cache to store a second cache line (e.g., see Figure 1, elements labeled by a 2);

a plurality of memory segments to track a volatile status for a subset of a memory segment as cache lines being as state bits to global lines and global sub-lines (e.g., see col. 2, line 46-60);

circuitry to allow access to the plurality of memory segments as being inherent since the memory modules allow line and sub-line granularity (e.g., see col. 3, lines 25-34);

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a pipeline to process instructions in either a program order or out of program order as a

system capable of having a multi-stage interconnection network particularly as instructions must

be processed or executed in either the program order or as out-of-order (e.g., see col. 2, lines 21-

45);

a set of execution units to execute the instructions as multiple processors (e.g., see Figure

1);

a set of caches coupled to the pipeline to store data required by the pipeline in either a

modified volatile, exclusive volatile or shared volatile state as private caches to the individual

processors (e.g., see Figure 1);

filling a cache line by executing a first volatile load request as a processor read which

does not change the state of the cache line and therefore does not require notification to other

processors (e.g., see col. 5, lines 42-43);

receiving a first request for a first segment of the cache line and placing the requested

data in a cache line as requesting sub-line sizes of data (e.g., see col. 2, lines 21-45);

indicating at least the first segment is in a non-volatile state as that reading or writing to

the first or any segment of a line requires a request to the global directory and permission must

be granted from the global directory for the execution of the action requested (e.g., see col. 3,

lines 3-16);

sending at least the first segment while maintaining the cache line in one of a modified

volatile state and an exclusive volatile state as a sub-line being in a transient or non-transient

state (e.g., see col. 3, lines 35-60); and,

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placing an indication of a shared volatile state associated with the requested data in the

cache line as signals or states placed in the global directory indicating the status of the requested

data and the possible usage of the requested data (e.g., see col. 3, line 61 to col. 4, line 57).

18.   As the Baylor reference teaches sub-lines of a cache line may have different ownership

and different statuses both the concepts of 'volatile' and 'non-volatile' are taught using the

Applicant's own definitions.

As to claim 2, Baylor teaches modifying a portion of the first segment of the cache line

and sending a notification of the modification as the protocol necessary for accessing or

modifying sub-lines of a cache line in the global directory (e.g., see Figure 3) with explanations

of the state diagram given at (e.g., see col. 6, line 51 to col. 7, line 43).

As to claim 3, Baylor teaches modifying a second segment of the cache line without

generating a notification of the modification and indicating the second segment is in a volatile

state as the cache protocol including modifying any of the cache sub-lines as a processor

accessing data in its associated cache with the data in the sub-line not being in a read-only status

in its cache therefore a response from the directory is not required (e.g., see col. 2, lines 46-60).

As to claim 4, Baylor teaches the cache line is a part of a first cache associated with a

first processor (e.g., see Figure 1).

As to claim 5, Baylor teaches sending data from the cache line to a second cache

associated with a second processor as sub-line data being transferred to the cache of a requesting

processor (e.g., see col. 7, lines 6-27).

As to claim 6, Baylor teaches receiving a second request for a different third segment of

the cache line and sending the third segment of the cache line while maintaining either the

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modified volatile state or an exclusive volatile state as being able to process a request for any

sub-line of a cache line when the data in the sub-line is modified (e.g., see col. 7, lines 6-27).

As to claim 7, Baylor teaches updating the cache line to indicate the third segment of the

cache line is in a non-volatile state as updating the cache line segment or sub-line when the states

of the cache line is transient therefore requiring permission from the global directory before the

update is performed (e.g., see 3, lines 3-16).

As to claim 8, Baylor teaches updating the cache line such that only the third segment of

the cache line is in a non-volatile state and invalidating the cache line from all other processors

holding the cache line or sending an updated copy of the cache line to a processor as invalidating

a cache line which is in a non-transient state (e.g., see col. 3, lines 17-34).

As to claim 10, Baylor teaches the volatile status is a modified volatile status as a

processor being able to modify data in a non-transient state in it's own cache without notifying

the global directory prior to the modification (e.g., see col. 3, lines 53-60).

As to claim 11, Baylor teaches the volatile status is a shared volatile status as a cache line

or sub-line which is shared or present in multiple caches (e.g., see col. 3, lines 17-34).

As to claim 12, Baylor teaches the volatile status is an exclusive volatile status as the data

being present in additional private caches but only one processor cache being able to modify the

data in either the cache line or sub-line (e.g., see col. 3, lines 17-34).

As to claim 14, Baylor teaches executing a load or a second volatile load request for data

held in the cache line in a non-volatile state and returning the result of the volatile load request as

the data of any of the sub-lines of the cache line being in a shared or non-shared state and status

bits for determining whether or not the global directory requires updating and granting of

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permission for a modification of any of the sub-lines of the cache line (e.g., see col. 3, lines 35-52).

As to 15, Baylor teaches executing a load or second volatile load request for a volatile portion of the cache line and placing the cache line in an invalid state being able to invalidate any sub-lines of a cache line (e.g., see col. 3, lines 35-52).

As to claim 16, Baylor teaches executing a load or second volatile load request for a volatile portion of the cache line and receiving an updated copy of the cache line in a shared volatile state with requested data in a non-volatile state as being shown in the state diagram for any of the sub-lines of a cache line (e.g., see Figure 3).

As to claim 18, Baylor teaches a means for indicating a first portion and a second portion of a segment of the means for storing data contains non-volatile data as status data for sub-lines of a cache line which require permission from the global directory for modifying any of the sub-lines (e.g., see col. 2, line 61 to col. 3, line 16).

As to claim 19, Baylor teaches a means for notifying a second means for storing data that a non-volatile data has been modified as handshaking (e.g., see col. 2, line 61 to col. 3, line 2).

As to claim 20, Baylor teaches a means for indicating multiple segments are in either a volatile or non-volatile state for a line of the means for storing data as maintaining status at a sub-line granularity level (e.g., see Figure 3 with the description of this figure in col. 3, line 51 to col. 4, line43).

As to claim 22, Baylor teaches a first processor associated with the first cache and a second processor associated with the second cache (e.g., see Figure 1).

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As to claim 23, Baylor teaches a system memory that is cached by the first and second caches (e.g., see col. 1, lines 29-42).

As to claim 24, Baylor teaches the first cache line indicates at least one non-volatile segment as the global directory containing status for both a global line and global sub-line for each line and sub-line entry (e.g., see col. 2, lines 46-60).

As to claim 25, Baylor teaches the first cache notifies the second cache of a change in the non-volatile portion of a cache line in either a modified volatile state, an exclusive volatile state or a shared volatile state as sub-line data being transferred to the cache of a requesting processor (e.g., see col. 7, lines 6-27).

As to claims 27 and 30, Baylor teaches the cache generates a notification upon modification of non-volatile data as responses from the global directory for updating both the data and the status bits of either/or the cache line or sub-lines (e.g., see col. 2, line 61 to col. 3, line 16).

As to claim 28, Baylor teaches the cache shares data containing a modified portion as a line mixed state where at least two caches have the same data but not every copy of the data is still valid indicating a sub-line of the cache line has been modified by one of the processors (e.g., see col. 3, lines 25-34).

As to claim 31, Baylor teaches indicating the size and position of a non-volatile portion of a cache line as sub-line granularity of the coherence protocol (e.g., see 2, lines 23-60).

RESPONSE TO APPLICANT'S REMARKS

19.   Applicant's arguments filed March 26, 2007 have been fully considered but they are not persuasive.

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20.   The Applicant is essentially presenting a defense of the use of the terms 'volatile' and 'nonvolatile' as being valid because these terms are being used based upon a normal (non-memory art specific definition) dictionary meaning but also that these terms are not ambiguous because they are well known in the memory art. The definitions of these terms in the memory art are very specific and while the technical definitions used by one of ordinary skill in the memory arts is not basically contrary to the standard dictionary definitions, the technical definitions go beyond the dictionary definitions in such a way that the Applicant's use of these terms is confusing and renders the claims indefinite. Such well known, established technical usage of terms cannot be used without specific, consistent redefinition of the terms by the Applicant. The terms 'volatile' and 'non-volatile' are used in the memory arts to describe memory storage devices. These terms have a long established definition which is tied to the actual hardware used for memory. Using these terms in the context of describing 'states' of cache lines is outside of the given practices.

21.   The dictionary definitions provided by the Applicant to support the use of the terms 'volatile' and 'non-volatile' in the present specification further confuse the use of these terms instead of clarifying their usage. The meanings found in investment dictionaries and medical dictionaries are not pertinent to usage of these terms in relationship to computer memory. Computer memory is the field of use for the present invention and there is no application in the fields of chemistry, finance or medicine. The one definition provided in the computer arts is for programming variables. The claims as well as the specification is directed toward cache lines and replacement protocol. This is not the same usage as programming variables. No where in

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the Applicant's specification is there a discussion of either programming variables, static

variables, volatile variables or non-volatile variables.

22.   Applicant's representative refers to the examiner's use of 'undue experimentation' as

being the basis of the lack of enablement rejection, however, this was never used in the previous

rejections. The objection and rejection has always been directed to misuse of terms in the art

which already have established definitions in the memory art.   By focusing on explanations as to

why 'undue experimentation' is inappropriate, the prosecution of the given claims is being

confused and obscured. The factors discussed on page 6 of the Appeal Brief filed March 26,

2207, relate specifically to the use of 'undue experimentation' for an enablement requirement

rejection. 'Undue experimentation' was not the basis of the rejection for failing to comply with

the enablement requirement.

CONCLUSION

23.   Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Reba I. Elmore, whose telephone number is (571) 272-4192. The

examiner can normally be reached on Monday and Thursday from 7:30am to 6:00pm, EST.

If attempts to reach the examiner by telephone are unsuccessful, the art unit supervisor

for AU 2189, Reginald G. Bragdon, can be reached for general questions concerning this

application at (571) 272-4204. Additionally, the official fax phone number for the art unit is
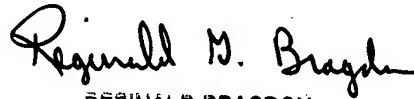
(571) 273-8300.

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Any inquiry of a general nature or relating to the status of this application or proceeding

should be directed to the Tech Center central telephone number is (571) 272-2100.

Reba I. Elmore
Primary Patent Examiner
Art Unit 2189

Monday, July 30, 2007

REGINALD BRAGDON
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2100

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